

# NASA TECH BRIEF



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## A Design Procedure for the Weight Optimization of Straight Finned Radiators

The design of space power systems is directed toward developing a minimum weight device for the required power output. For systems developing large quantities of electrical power, in the several 100-watt and kilowatt range, the radiators usually take the form of large panels containing a network of passages through which the power converter coolant flows. In the case of smaller systems, the radiator usually takes the form of straight fins extending radially from a central body which contains the power conversion device. The waste heat is transmitted to the finned radiator from the conversion device by conduction.

Several analyses of the latter type of radiator have appeared in the literature. These analyses, however, do not lend themselves to rapid design of finned radiators. A NASA Technical Note, "A Design Procedure for the Weight Optimization of Straight Finned Radiators", by D. W. Harris, R. J. Burian, and J. J. Ketchman, TN D-3489, August 1966, presents a technique based on these analyses whereby a weight optimized space radiator consisting of a finned, right circular cylinder can be readily evaluated.

From data presented in the literature, the Technical Note derives 3 design equations which relate 12 geometric, thermal, environmental, and material parameters of an idealized fin system with no base cylinder

interaction. A fourth equation is derived to take into account the base cylinder interaction and to reduce the idealized design to the realistic case. Three families of curves and auxiliary tables assist in the rapid reduction of the idealized design equations.

### Notes:

1. The Technical Note is available from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151—price \$2.00
2. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer  
Goddard Space Flight Center  
Greenbelt, Maryland 20771  
Reference: B66-10618

### Patent status:

No patent action is contemplated by NASA.

Source: D. W. Harris  
of Goddard Space Flight Center  
and R. J. Burian and J. J. Ketchman  
of Batelle Memorial Institute  
under contract to  
Goddard Space Flight Center  
(GSFC-547)

Category 05